Consolidated Space Operations Contract

Space Network (SN)
Web Services Interface (SWSI)

Transition Plan

March 26, 2002

FINAL DRAFT

Contract Number NAS9-098100

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Web Services Interface (SWSI)

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Preface

This document provides the plan for the transition of the Space Network (SN) Web Services Interface (SWSI) from NASA/SODA development into CSOC operations, maintenance and sustaining engineering. This document is specifically written to establish guidelines and responsibilities for the orderly handover of the SWSI from NASA/GSFC Code 450 to CSOC sustaining support. It is intended to provide a plan for the Transition Team to follow. This plan will ensure a smooth transition of the system into routine operations and maintenance.

This document provides an overview of the activities related to the relocation, testing and transition of SWSI to operations.

Questions and proposed changes concerning this document shall be addressed to:

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1 Introduction

1.1 Purpose

The purpose of this Transition Plan is to detail the activities necessary for the successful transition of the Space Network (SN) Web Services Interface (SWSI) developed through the National Aeronautics and Space Administration (NASA)/Space Operations Directive Agreement (SODA) to sustained operations under the Consolidated Space Operations Contract (CSOC) control. By identifying roles and responsibilities, specific functional relocation plans, and test approaches, each organization can plan for the SWSI implementation and identify potential risks as they arise.

1.2 Scope

This document describes how and when SWSI components will be moved. In addition, assumptions and dependencies as well as the approach for training, sustaining, and testing are included. This plan does not include detailed schedules, facility diagrams, inventories, and specific task assignments. These details will be provided in engineering instruction documents prior to the move.

This plan describes staffing allocations and a general approach to applying existing expertise to transition issues including training and interim support. It does not describe the schedule, risks, and relative impacts of staffing changes at particular sites.

1.3 Goal

The primary goal of SWSI is to provide a standards-based customer interface for performing Tracking and Data Relay Satellite (TDRS) and Demand Access System (DAS) scheduling and real-time service monitoring and control. The intent of the SWSI is not to replace existing scheduling and real-time systems for all SN customers. It is rather to provide a simple low-cost interface option, especially for sub-orbital and infrequent SN customers. SWSI does however provide the primary customer interface for all DAS customers.

1.4 Background

The interface between a customer Mission Operations Center (MOC) and the Network Control Center Data System (NCCDS) consists of formatted messages exchanged electronically using either Nascom 4800 Bit Block (BB) protocol or Transmission Control Protocol (TCP). This interface is described in detail in the NCCDS/MOC Interface Control Document (ICD). New SN customers have traditionally been provided with a limited number of options for implementing this interface. A full-featured SN scheduling tool is provided by the User Planning System (UPS), which runs on a Hewlett-Packard (HP) Unix host. New customers desiring to use UPS for scheduling must either purchase their own system or interface with an institutional UPS located within the Multisatellite Operations Control Center (MSOCC). A NASA Integrated Services Network (NISN) Closed Internet Protocol (IP) Operational Network (IONET) connection is required for the latter option.

No standard option exists to provide a real-time (reconfiguration and performance data monitoring) interface. All SN customers have been required to implement their own systems at considerable cost.

Prospective SN customers have brought to light the need for a simple, standard, readily available interface to the NCCDS. In response to this need, NASA funded an in-house project to determine the feasibility of such a tool. This project resulted in a prototype of a web-based cross-platform customer interface to the NCCDS, called the SN Web Services Interface (SWSI). Prototyping and proof of concept work was completed and has been used to provide support to the Long Duration Balloon Project (LDBP).

The final operational SWSI is a follow-on to the prototype effort and will provide improvements in the form of a Java-based Graphical User Interface (GUI) and better management of user schedule information. Using the SWSI, SN customers will be able to perform scheduling, real-time functions, and state vector storage for only the cost of a desktop computer or workstation. A web browser and a Java virtual machine, both of which are freely available, will also be required. The SWSI is designed to be accessed from the NISN Closed IONET or Open IONET. NISN's Open IONET allows access from the NASA Science Internet and the public Internet, thus allowing cooperation with NASA's university, enterprise, and inter/intra-agency partners.

In addition to providing this interface to the NCCDS for legacy SN services, the SWSI will provide the customer interface for scheduling the newer DAS Multiple Access Return (MAR) services. The advantage to the DAS Project is that SWSI already provides the infrastructure needed by DAS to provide similar customer interface capabilities. Adding a DAS interface to SWSI will spare the DAS Project the expense of duplicating those facilities and will provide a single integrated application for customers to perform both legacy SN and DAS scheduling, monitoring, and control.

1.5 System Description

The primary function of SWSI is to provide a Java-based web interface to perform customer scheduling, real-time service monitoring and control, and state vector storage. The SWSI performs the following major functions:

- Support all full support customer messages as defined in the NCCDS/MOC ICD.
- Support all messages as defined in the Demand Access System (DAS)/SWSI ICD.
- Allow a customer to submit all schedule request messages as defined in the ICDs.
- Maintain a database of customer Service Specification Codes (SSCs) that matches the NCCDS database to assist the customer in generating schedule requests.
- Allow for customer maintenance of DAS-specific SSCs.
- Provide for customer scheduling of DAS playback events.
- Maintain an active schedule file derived from Schedule Result Messages (SRMs) and User Schedule Messages (USMs) received from the NCCDS.
- Provide an Active Schedule display consisting of events for both NCCDS and DAS scheduled services.
- Allow a customer to generate Ground Control Message Requests (GCMRs) and display results received from the NCCDS.

- Allow a customer to generate DAS Service Reconfiguration Messages and display results received from DAS.
- For each active NCCDS event, maintain a list of current parameter settings that reflects initial values and any parameters changed in response to User Reconfiguration Request messages.
- Provide for monitoring of NCCDS and DAS User Performance Data (UPD) in user-configurable displays.
- Store Return Channel Time Delay Messages (RCTDM) and Time Transfer Messages (TTM) received from the NCCDS in binary files on the customer workstation for later processing by customer applications.
- Generate Type 8 (stationary) state vectors based on customer entry of latitude, longitude, and altitude and forward them to NCCDS and/or DAS, depending on which system(s) is used to support that spacecraft.
- Allow a user to import state vectors and forward them to NCCDS and/or DAS, depending on which system(s) is used to support that spacecraft.
- Provide simultaneous access to both the operational NCCDS and the Auxiliary Network Control Center (ANCC) for performing Engineering Interface (EIF) testing.
- Allow access from NASA Integrated Services Network (NISN) Closed IONET, Open IONET, and Internet.
- Provide for secure message exchange using encryption
- Log all formatted messages exchanged with the NCCDS and DAS, as well as significant events and errors. Provide a delogging capability to allow an operator to view logs.
- Provide a High Availability (HA) configuration to adhere to existing NCCDS Reliability/Maintainability/Availability (RMA) requirements.
- Provide customer access to Tracking and Data Relay Satellite System (TDRSS) Unscheduled Time (TUT) information from the Open IONET and Internet.

SWSI will not provide any of the shuttle specific support services.

A block diagram showing the high level SWSI architecture is given in Figure 1-1.

The SWSI consist of three components and seven subsystems. The SWSI components are Client, Open Server, and Backend Server and the subsystems are Client, Application Server, Isolator, SWSI-NCCDS Interface (SNIF), SWSI-DAS Interface (SDIF), database, and Open TDRSS Unscheduled Time (TUT) Server. The Client component is the user's desktop, which can be any desktop that supports Java Virtual Machine (JVM) 1.2. The Client subsystem is executed on the Client's component and its main function is to allow remote users to schedule Space Network resources with NCCDS and to provide Graphical User Interface (GUI) to monitor status of the scheduled resources.

The second component is the mid-tier server called Open SWSI Server. It hosts the SWSI Application subsystem, Open TUT Server subsystem, and other Commercial Off The Shelf (COTS) packages; i.e. web server, and security tools (e.g. IP filtering, tcp_wrapper). The server is connected on the Open IONet. The main function of the Application Server subsystem is to keep track of the user requests and provide the requested information to the Client subsystem.

There is a NISN Secure Gateway between the Open Server and the Backend Server. The instance of the SWSI Application Server running on the Open Server component is for the Open IONet and Internet users. It also acts a proxy server for the Client component and minimizes the "holes" required on the NISN Secure Gateway to support SWSI users.

The third component is the Closed Server, which is connected on the Closed IONet. It hosts - SNIF, SDIF, two instances of the Isolator subsystem and an instance of the Application Server subsystem. It is also used as the SWSI database server. The instance of the Application Server subsystem is for the closed IONet users. One instance of the Isolator connects with the Application Server running on the Open Server and the other connects with the Application Server running on the Backend Server.

The Application Server subsystem communicates with the Client and Isolator subsystems via secure SSL connections. The Isolator communicates with SNIF and SDIF, which will handle all communications with the NCCDS and the DAS Controller (DASCON).

The Open Server component and the Backend Server component consists of two physical hosts for redundancy. The Backend Server contains SWSI data including user's information in the shared database storage. The Backend Server is responsible for all communications with the NCCDS and with DASCON.

1.5.1 Hardware

The SWSI system configuration consists of unique hardware that is to be interfaced on an Open and Closed IONet environment.

The Open Server system configuration consists of two (prime and backup) Sun Ultra 2 workstations that host the Application Server (for the Open clients) and TUT (Web Servers), and has an external tape drive for system backups.

The Closed Server system configuration consists of two (prime and backup) Sun Blade 1000 workstations that host the Application Server (for the Closed clients), the Isolator (open and closed clients), the SNIF, the SDIF, and a Sun A1000 RAID Disk Array. Figure 1-1 depicts the SWSI architecture; Table 1-1 shows specific system hardware required for SWSI operations at WSC and for SWSI sustaining hardware maintenance at GSFC. Table 1-2 depicts the SWSI hardware specifics.

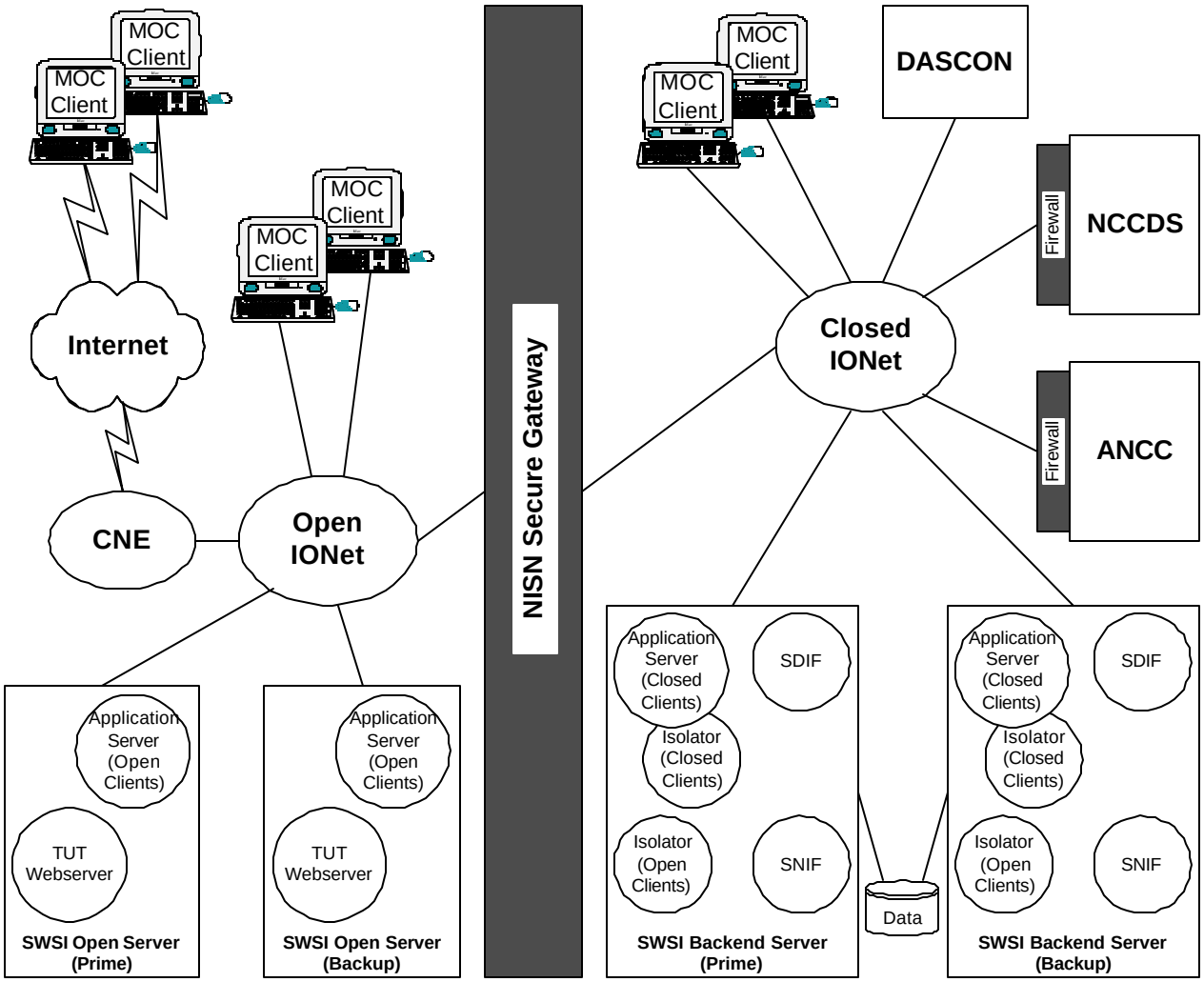

Figure 1-1 - SWSI Architecture

Table 1-1 - SWSI Hardware

Operations Hardware
• Sun Ultra 2 Workstation (Open Server/Prime) with an External Tape Drive
• Sun Ultra 2 Workstation (Open Server/Backup) with an External Tape Drive
• Sun Blade 1000 Workstation (Backend Server/Prime)
• Sun Blade 1000 Workstation (Backend Server/Backup)
• Sun A1000 RAID Disk Array (Backend Disk Drive)
• Sun A1000 RAID Disk Array (Spare)
Maintenance Hardware
• Sun Ultra 2 Model 1300 Workstation (Open Server/Test Platform) with an External Tape Drive
• Sun Ultra 2 Model 1300 Workstation (Backend Server/Test Platform) with an External Tape Drive
• Sun Ultra 2 Model 1300 Workstation (Development Server Platform) with an External Tape Drive
• DELL Personal Computer (Client Workstation/Development Platform)
• DELL Personal Computer (Client Workstation/Test Platform)
• LaserJet 4MV Printer (Development Platform)
• (3) HP Xterminals (Development Platform)

CSOC hardware engineering will provide detailed plans which will include the specific roles and responsibilities for each organization, cabling instructions and floor placement, complete inventories including serial numbers, power requirements, network configuration, and any special handling instructions. GSFC Hardware Engineering will provide support data, including documentation, inventories, and connectivity information. These plans will be reviewed and coordinated with CSOC Hardware Engineering personnel.

All new cables will be used in this installation. All consoles and/or computer tables will be reused from their original configurations.

CSOC Hardware Engineering personnel will coordinate facilities preparation.

GSFC Shipping and Receiving will perform SWSI equipment packing for shipment based on inputs from Hardware Engineering. GSFC Shipping and Receiving will make transportation arrangements for SWSI equipment. SWSI equipment will be unpacked, inspected, and installed by CSOC Hardware Engineering.

Updates to Sustaining Engineering documentation including cable running lists, floor diagrams, power assignments, and other documentation will be performed by the respective CSOC Sustaining Engineering organization. All documentation will be transitioned to the CSOC Document and Data Control System (DDCS) after implementation and transition to operations is complete.

1.5.2 Software

SWSI is a new system. The table below shows specific application system software and SWSI COTS system software required for SWSI operations at WSC and for SWSI sustaining software maintenance at GSFC.

Table 1-2 - SWSI Software

	Operations Software	Maintenance Software
Application System Software		
• SWSI (MOC) Client	X	X
• Application Server	X	X
• Isolator	X	X
• SNIF	X	X
• SDIF	X	X
• Database	X	X
• TUT	X	X
SWSI COTS System Software		
• Solaris 8 Operating System	X	X
• Sun Professional Developer Suite		X
• GNU Development Tools		
o GNU C Compiler (GCC) 2.95.2		X
o GNU Debugger (GDB) 4.18		X
o Data Display Debugger (DDD) 3.1.3		X
• JBuilder Professional 3.5		X
• Oracle 8i Enterprise Edition Server 8.1.6	X	X
• Oracle Pro*C 8.1.6.0.0		X

• Java Development Kit (JDK) - Java 2 Standard Edition 1.3.1 (free)		X
• Java Run-time Environment (JRE)	X	X
• HotSpot 1.0.1 (free)	X	X
• InfoBus 1.2 (free)	X	X
• Phaos SSLava™ Toolkit 1.11-4	X	X
• Phaos J/CA Toolkit (for digital certificate generation for Build 1) to be replaced by NASA supplied Entrust Certificate	X	X
• Oracle supplied JDBC Thin Driver	X	X
• Turbo XML V2.2 - TIBCO Extensibility		X

2 Transition Activities

This section discusses the migration of the SWSI (currently under NASA/SODA development at GSFC) into CSOC O&M and sustaining engineering.

2.1 System Reviews

Below are the major SWSI system reviews and other associated reviews (completed and planned).

- Requirements/Design Review 10/13/00
- Delta R/DR 02/22/01
- NCCDS Test Readiness Review 12/03/01
- DAS Operations Readiness Review 08/27/02
- SWSI Operations Readiness Review 09/17/02
- SWSI Transition Readiness Review 09/17/02

2.2 Transition Agreement

The Transition to CSOC completion form will utilize the SWSI Transition Agreement as a basis for transition. The process will entail an evaluation by the contractor of the state of the SWSI system for operational use. The evaluation process will encompass the generation of a report by the contractor evaluating the state of readiness for conductance of a SWSI Transition Readiness Review (TRR). In addition the contractor will identify in the report any outstanding issues, discrepancies, and/or system liens, which preclude a transition to SWSI service accountability. The CSOC O&M Contractor shall assume responsibility of operations of the SWSI after successful systems acceptance testing, end-to-end testing, and conduct of an Operations Readiness Review (ORR) and TRR. SWSI operations and maintenance will be performed at the Whitesands Complex (WSC) whereas SWSI sustaining engineering will remain at GSFC.

2.2.1 Assumptions

a) Throughout development, the SWSI development team is responsible for complete systems development, internal integration and system testing.

b) SWSI independent functional tests will be performed by CSOC Network Integration Analysis (NIA) personnel on the SODA task.

c) The SWSI development team is also responsible for the regression/system testing.

d) CSOC Production Operations personnel will support system installation, system checkout, and end-to-end tests (i.e. Operational Evaluation Tests (OET)).

e) DAS Interface Testing will be performed to verify system and performance interfaces.

f) The SWSI Development Team will provide thorough documentation and training for the systems successful transition in to operations.

g) The link to the Closed and Open IONet will be fully operational and fault tolerant at the time of installation.

2.2.2 Constraints

a) SWSI/DAS interface testing will occur upon NASA's determination of DAS test readiness.

b) SWSI transition to operations will follow successful end-to-end testing and operator training at WSC.

c) DSMC Operational Readiness to incorporate SWSI.

2.2.3 Dependencies

a) SWSI has completed the development and test phases of implementation.

b) SWSI requires Closed and Open IONet address space available at the WSC prior to shipment from GSFC.

c) Bandwidth requirements **(TBD)**

2.2.4 Security

SWSI adheres to the NASA Procedures and Guidelines for Security of Information Technology, NPG 2810.1. For all aspects of communications via the IONet, the SWSI shall comply with IP Operational Network (IONet) Security Plan, 290-003 and IP Operational Network (IONet) Access Protection Policy and Requirements, 290-004. However, in case of conflicts between NPG 2810.1, 290-003, and 290-004, 290-003 and 290-004 has precedence.

There are currently no known security issues related to SWSI.

2.2.5 Risk Assessment

Currently there are no known system risks associated with the SWSI; however, mission risk will exist if dedicated software sustaining resources are not properly applied to SWSI once it is operational. Since it is a new system, software problems and other change requests will be generated as customers use the system. Therefore, SWSI needs to be pro-actively sustained in order to ensure these missions are successful. Failure to be responsive in resolving anomalies could result in the degradation of mission success.

WSC Production Operations and Security Engineering will identify any liens against the system, evaluate risks, and prepare mitigation efforts to minimize potential impact to operations.

2.2.6 Baseline Management During Transition

CSOC Operations Integration and Test (OI&T) will establish a hardware and software baseline configuration freeze prior to the beginning of transition. During the baseline freeze, all baseline changes, including critical problem reports required to support operations, will be reviewed, documented and approved by GSFC and reported to CSOC OI&T.

2.3 System Build-up and Transition Schedule

SWSI transition to CSOC Operations will be performed prior to operational deployment. The system builds will be thoroughly tested in the test environment at GSFC. Both SWSI NCCDS and DAS Interface Acceptance Tests will be performed at GSFC. In parallel with system interface acceptance tests, specific mission interface tests will be performed (i.e. Gravity Probe-B). The system will then be relocated and installed at WSC. Upon successful completion of system installation and checkout at WSC, system end-to-end tests will be performed. The SWSI development team will also provide WSC Operator coordination and formal training. The SWSI ORR will be convened in conjunction with a TRR. Reference the Master Schedule for detailed schedule information at - http://msp.gsfc.nasa.gov/swsi/schedule/schedule.htm.

2.3.1 Training

The SWSI Development Team (under the NASA/SODA) will provide CSOC personnel with administrative, operations, and maintenance training. Along with the training, NASA/SODA will be responsible for providing a Users Guide, Administration Guide, ICDs, Configuration Items (CI) lists, and an Operational Training Presentation Package. SWSI user training will also be incorporated in to the NASA/CSOC TDRSS Orientation Course (STDN 880/890 Training). Unique user training will be provided to specific projects on request as a mission reimbursable cost.

2.3.2 Test and Checkout

SWSI transition from NASA/SODA to CSOC operations will begin upon successful completion of system installation, checkout and end-to-end testing at WSC. CSOC site Operations Engineering will support the system installation and checkout. CSOC system administration and software sustaining will verify the configuration of operating systems, custom and COTS software, and network configurations. The test scenarios and test scripts developed for system testing at GSFC will be used to test the SWSI system at WSC and with mission user.

2.4 Operations Transition

SWSI will be transitioned from a NASA/SODA development task into CSOC operations following successful system installation, checkout, and end-to-end testing at WSC. The SWSI ORR will be convened in conjunction with a TRR.

2.4.1 Staffing and Recurring Costs

Recurring staffing will consist of Software Sustaining Engineers and O&M personnel. Since the developed team is at GSFC, recurring software sustaining engineering will be accomplished at GSFC until it is determined that this function can be transferred to WSC. It is expected that software sustaining will require an average of .8 FTE for the life of the contract. System O&M will be performed at both WSC and GSFC. O&M will be responsible for system administration, security administration, and supporting operations of the Open and Closed IONet servers. This "help desk" support is estimated to be approximately 0.7 EPs (.2 EPs at GSFC and .6 EPs at WSC).

System augmentation and enhancements will be accomplished with additional funding.

2.4.2 Other Recurring Costs

All application software and licenses will be provided for this transition. The recurring costs associated with the Commercial Off The Shelf (COTS) products utilized by the SWSI are summarized in the table below.

Table 2-2 - Recurring Costs

Product Name	Vendor	Estimated Annual Cost
(5) Sun Ultra Workstations - Service Agreements	Sun Micro Systems	$988.00 X 5 = $4,940.00
(2) Sun Blade 1000 Workstations - Service Agreements	Sun Micro Systems	$492.00 X 2 = $984.00
(2) Sun A1000 RAID Disk Arrays – Service Agreements	Sun Micro Systems	$1,000.00 X 2 = $2,000.00
(2) DELL PCs	Dell	$150.00 X 2 = $300.00
Phaos SSLava Toolkit	Phaos Tech	$2,000.00
J/CA Certification Toolkit	Phaos Tech	$3,000.00
Jbuilder Professional 3.5	Inprise	$1,000.00
Turbo XML	TIBCO Extensibility	$100.00

Existing CSOC “umbrella” licenses will apply to the Oracle products.

In addition, a minor amount of mission support travel may be required to assist new mission customers with SWSI use, configuration, and interfaces.

2.4.3 Procedure Updates

The SWSI development team will provide a SWSI User Guide and SWSI Administration Guide as well as A SWSI Client/Server Interface Definition Document (IDD) and a Client Application Programming Interface (API) definition document. Local Operating Procedures (LOPs) will be updated by CSOC O&M to incorporate the new SWSI capabilities, functionality and interfaces.

2.4.4 Approach to Cut Over

SWSI Users that are currently using the NASA prototype system will begin interfacing with the new system during a series of system interface tests prior to SWSI’s transition to operations. System training will also be provided to those “legacy” SWSI users. As new users come on-line they will be provided SWSI training via the TDRSS Orientation Course (STDN 880/890) as well

as a systems users guide. Since SWSI is a new system (independent of NCC Build Releases), release cutover planning is not required.

2.4.5 Fallback Approach

In the event that new SWSI is not operationally available for user support, the existing network scheduling procedures and user interfaces will be utilized. In addition, the NASA developed SWSI Prototype System can be made available to provide continued user support to specified missions.

In the event that the DAS is not operational at WSC, SWSI will provide functional support to the NCCDS only.

2.5 Sustaining Engineering

2.5.1 Hardware

The SWSI/SODA development team will support SWSI equipment throughout the transition period. This will include support for the dismantling and packing of the SWSI hardware, installation support for sustaining engineering, and training to CSOC operations. Other activities, including identifying test equipment and spares are expected to occur during the SWSI transition. CSOC hardware sustaining will be fully responsible for the sustaining of SWSI components after acceptance testing has been performed and all training activities have been completed.

2.5.2 Software

After SWSI transitions to CSOC operations, software sustaining engineering will be accomplished at GSFC, and the following functions will be performed.

1. Participate in the System Evaluation Review Board (SERB) for the screening, assessment, assignment, scheduling and tracking of approved, in-scope change requests, including discrepancy reports.
2. Support the operators and testers of the SWSI, including end-user support. Support includes the identification, isolation and resolution of system-level anomalies as well as configuration and setup of SWSI client software at end user's facility.
3. Coordinate release contents and implement changes to resolve change requests as directed by the SERB.
4. Maintain the integrity and configuration management of the system baseline with regard to the implementation of approved changes.
5. Provide cost and impact assessments for change requests determined to be out of scope such that appropriate funding can be identified.

2.6 Configuration Management

The CSOC Program Configuration Management (CM) Office establishes program wide CM policies. The process in accordance with the CSOC CM Plan (CSOC-CEN-PI50.001037) will be followed to track any changes to the baseline configuration.

A SWSI internal discrepancy system is used for tracking and reporting system Discrepancy Reports (DR). It is planned to transition the discrepancy system to WSC for problem identification and resolution procedures to be used between operations at WSC and sustaining engineering at GSFC. Any unresolved DRs and their disposition should be discussed at the TRR.

2.7 Documentation

The SWSI development team will provide proper hardware, software, and systems documentation as part of SWSI system delivery to CSOC O&M. The following documents will be provided upon system operational readiness and transition:

1. SWSI User's Guide
2. System Administrator Manual
3. Training Plan
4. Acceptance Test Plans and Test Result Reports
5. Project Verification Matrix (PVM)
6. Hardware/Software CI Lists
7. Security Plan
8. Transition Agreement and Transition Plan
9. "Site Prep" and Installation Plans including High Level Logistics Support Plan (if required)
10. SWSI Client/Server Interface Definition Document
11. SWSI Client API
12. SWSI System Design Specification

2.8 Operational and Transition Readiness Review

Prior to TRR, system checkout and end-to-end testing will be performed at WSC to validate performance and functional capabilities. Upon this test completion an ORR will be conducted in conjunction with a TRR to certify that the SWSI system is operationally effective and suitable for use in day-to-day operations. The development team will work with WSC operations to prepare the Transition Readiness Report to document any actions, DR, or liens on the system.

Appendix A – Abbreviations and Acronyms

ANCC	Auxiliary Network Control Center
API	Application Programming Interface
BB	Bit Block
CI	Configuration Items
CM	Configuration Management
CSOC	Consolidated Space Operations Contract
COTS	Commercial Off The Shelf
DAS	Demand Access System
DASCON	DAS Controller
DDCS	Document and Data Control System
DR	Discrepancy Report
EIF	Engineering Interface
GCMR	Ground Configuration Message Request
GSFC	Goddard Space Flight Center
GT	Ground Terminal
GUI	Graphical User Interface
HA	High Availability
HP	Hewlett-Packard
ICD	Interface Control Document
IDD	Interface Definition Document
IONet	Internet Protocol Operational Network
IP	Internet Protocol
JVM	Java Virtual Machine
LDBP	Long Duration Balloon Project
LOP	Local Operating Procedures
MAR	Multiple Access Return
MOC	Mission Operations Center
MSOCC	Multisatellite Operations Control Center
NASA	National Aeronautics and Space Administration
NCCDS	Network Control Center Data System
NIA	Network Integration Analysis
NISN	NASA Integrated Services Network
OET	Operational Evaluation Test
OI&T	Operations Integration and Test
ORR	Operations Readiness Review
PVM	Project Verification Matrix
RCTDM	Return Channel Time Delay Messages
RMA	Reliability/Maintainability/Availability
SERB	System Evaluation Review Board
SDIF	SWSI-DAS Interface
SN	Space Network
SNIF	SWSI-NCCDS Interface

SODA	Space Operations Directive Agreement
SRM	Schedule Result Message
SSC	Service Specification Code
SWSI	SN Web Services Interface
TCP	Transmission Control Protocol
TDRSS	Tracking and Data Relay Satellite System
TRR	Transition Readiness Review
TTM	Time Transfer Messages
TUT	TDRSS Unscheduled Time
UPD	User Performance Data
UPS	User Planning System
USM	User Schedule Message
WSC	Whitesands Complex

Appendix B – Reference Documents

1. Network Control Center Data System (NCCDS) System Requirements, 1998, 530-SRD-NCCDS/1998
2. Interface Control Document Between the Network Control Center Data System and Mission Operations Center, 530-ICD-NCCDS/MOC
3. Demand Access System (DAS) Systems Requirements Document, 451-SRD-DAS
4. Interface Control Document Between the Demand Access System and the Space Network Web Services Interface, 451-ICD-DAS/SWSI
5. NCCDS Protocol Gateway Operator's Guide Release 98.1, 451-NPGUG/NCC98
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16. IP Operational Network (IONet) Security Plan, 290-003, September 1999
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Appendix C – Project Deliverables

To be provided

Appendix D – Points of Contact

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Appendix E – Schedule

ID	Task Name	Start	Finish
1	**Project Start**	**Sat 4/15/00**	**Sat 4/15/00**
2			
3	NCCDS I/F Detailed Design	Mon 4/17/00	Fri 10/13/00
4	**Requirements/Design Review**	Fri 10/13/00	Fri 10/13/00
5			
6	**DAS PDR**	Thu 10/26/00	Thu 10/26/00
7	DAS I/F Detailed Design	Thu 10/26/00	Thu 2/15/01
8	**DAS CDR**	Thu 2/22/01	Thu 2/22/01
9	**SWSI Delta R/DR**	Thu 2/22/01	Thu 2/22/01
10			
11	Build 0 Development & Test	Mon 10/16/00	Fri 12/29/00
12	Build 1 Development & Test	Mon 1/1/01	Fri 3/16/01
13	Build 2 Development & Test	Mon 3/19/01	Fri 6/15/01
14	Build 3 Development & Test	Mon 6/18/01	Wed 10/31/01
15	Build 4 (Enhancement) Development & Test	Mon 4/1/02	Fri 6/28/02
16	Build 4 Independent Test	Mon 7/1/02	Fri 7/5/02
17	Release 1 Integration & Test (inc. Debug)	Mon 7/8/02	Fri 7/19/02
18			
19	**NCCDS Test Readiness Review**	Mon 12/3/01	Mon 12/3/01
20			
21	DAS I/F Acceptance Test	Mon 4/15/02	Fri 6/28/02
22			
23	NCCDS I/F Acceptance Test	Mon 12/3/01	Thu 1/31/02
24			
25	Gravity Probe-B I/F Testing	Mon 3/4/02	Tue 4/30/02
26			
27	**Shipping and Installation**	**Mon 7/22/02**	**Fri 8/23/02**
28	Tear Down	Mon 7/22/02	Wed 7/24/02
29	Ship to WSC	Mon 7/29/02	Fri 8/2/02
30	Installation	Mon 8/5/02	Fri 8/9/02
31	System Checkout	Mon 8/12/02	Fri 8/16/02
32	WSC Operator Training	Wed 8/14/02	Tue 8/20/02
33	End-to-End Test	Mon 8/19/02	Fri 8/23/02
34			
35	Support DAS Ops. Readiness Review	Mon 8/26/02	Mon 8/26/02
36	**Operational Readiness Review**	Tue 9/17/02	Tue 9/17/02
37	**Transition to Operations at WSC**	Tue 9/17/02	Tue 9/17/02
38		Mon 6/3/02	Mon 6/3/02
39	**External Factors**	**Thu 4/4/02**	**Thu 9/19/02**
40	DAS ORR	Mon 8/26/02	Mon 8/26/02
41	STS-110	Thu 4/4/02	Thu 4/18/02
42	STS-111	Mon 5/6/02	Fri 5/17/02
43	STS-109	Thu 7/11/02	Thu 8/1/02
44	STS-112	Thu 8/15/02	Thu 8/15/02
45	STS-113	Thu 9/19/02	Thu 9/19/02